The applicants respectfully traverse this objection to the drawings. The drawings were filed as part of the original Application on April 7, 1997. Indeed, the Notice acknowledges this filing date.

The rule governing sheet size and margins in patent application drawings, as apparently relied upon by the Patent and Trademark Office, appears to be the current version of 37 C.F.R. 1.84, subsections (f) and (g), which became effective as of July 1, 1997. This rule permits two sizes (A-4 and 8 1/2 x 11) and sets a left side margin of at least 2.5 cm.

In contrast, please note the governing rule in effect when this application was filed, namely 37 C.F.R. 1.84 subsection (b), indicating the two sizes noted above, and two further acceptable sizes: 8 1/2 x 14 and 8 1/2 x 13. For these latter sizes, side and bottom margins of 1/4 inch or more are acceptable.

In short, the drawings satisfy the drawing requirements in effect when the drawings were filed.

In view of the above, the applicants respectfully request a review of the drawings under the appropriate standard. Should the PTO persist in this objection, substitute drawings shall be filed after receipt of the Notice of Allowability.

B. Claims 9-12 have been rejected under 35 U.S.C. 112, second paragraph, as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter of the invention.

In view of the amendment to claim 9, claims 9-12 are believed to satisfy the requirement of Section 112, second paragraph.

C. Claims 1-6, 22, 23 and 25-27 stand rejected under 35 U.S.C. 102(b) as allegedly anticipated by U. S. Patent No. 5,021,906 (Chang, et al).

The Chang patent discloses a programmable air bearing slider with a leading edge region, a trailing edge region, and a piezoelectric central region joining the edge regions. The central region is controlled electrically to change the angle between leading and trailing edge regions, which changes the flying characteristics of the transducer, in particular changing the flying height between the trailing edge region and the magnetic disk data recording surface. A data

A

transducer is mounted to the trailing edge region. Accordingly, the flying height between the transducer and the data surface is changed as well. Specifically, deforming the central region to create a positive crown, i.e. increasing a convex curvature toward the data surface, reduces the height of the transducer because it reduces the height of the entire trailing edge region. See, for example, column 4 lines 55-63 and column 6 lines 3-11.

The central region is deformed or bowed piezoelectrically, i.e. by applying a voltage to the piezoelectric material.

Temperature effects, to the extent recognized in Chang, are discussed in the context of reducing an undesirable "thermal warping" effect. Specifically, Figure 15 shows a slider with an upper piezoelectric region 340 and a lower, inactive piezoelectric region 343, said to provide a symmetry to substantially reduce thermal warping of the slider (column 7 lines 2-31).

In the course of this rejection, it is contended in the Action that Figure 13 and accompanying text teach a piezoelectric material with a different thermal expansion coefficient than the rest of the slider as enabling positioning of a transducer relative to a recording medium.

To the extent that the foregoing contention is advanced as a teaching the use of temperature to control a transducer's position, the contention is respectfully traversed. In Chang, transducer position control is based entirely on the piezoelectric effect, i.e. the mechanical distortion of the piezoelectric material in response to the applied voltage. Temperature effects are discussed only as a problem, minimized by providing an inactive piezoelectric material region for symmetry, in hopes that temperature warping will be balanced.

In accordance with claim 1, when a slider body is aerodynamically supported in an operating position, an air bearing surface of the slider is spaced apart from a data surface of a magnetic data reading and recording medium by a nominal flying height. A magnetic transducer is supported with respect to the slider body near the air bearing surface, for movement toward and away from the air bearing surface in response to changes in an operating temperature of the slider body proximate the transducer. A transducer spacing controller controls the operating temperature to adjust the transducer position relative to the air bearing surface. With the slider

body in the operating position, this adjustment also determines the separation distance between the transducer and the data surface, independently of the nominal flying height.

As noted in the present specification (page 6 beginning at line 17), independence of the transducer with respect to the slider body permits a fine tuning of the transducer position, and allows a low transducer flying height in combination with a higher slider flying height. The higher slider flying height enhances stability, while the lower transducer flying height allows an increase in data density. Any unwanted temperature effect, due to a change in ambient conditions, can be compensated by controlling the operating temperature. Thermal control allows fine tuning without the need for piezoelectric material. This avoids the fabrication difficulties and large activation voltages required for piezoelectric sliders. Piezoelectric schemes, such as those in Chang, can take thermal expansions and elastic deformations into account indirectly, but cannot limit or otherwise influence these phenomena. See the specification at page 4 lines 1-6.

As noted above, Chang deals with temperature effects only in terms of inactive structures of piezoelectric material to compensate or balance the thermal effects. There is no teaching of the use of temperature as an active control mechanism, and thus no teaching or suggestion of the transducer spacing controller in claim 1.

Further, Chang fails to teach or suggest a magnetic transducer supported for a movement toward and away from an air bearing surface of the slider in response to changes in operating temperature. In Chang, the transducer (e.g. 42, 142) moves with the trailing region. The transducer height is changed by changing the height of the trailing region. There is no adjustment of the transducer position relative to the trailing region. Thus, there is no determination of a transducer separation from the data surface independently of the slider's nominal flying height.

The standard for anticipation is stringent, requiring that the allegedly anticipatory reference disclose each and every element of the claimed invention, arranged as in the claim. <u>Lindeman v. American Hoist</u>, 221 U.S.P.Q. 481 (Fed. Cir. 1984); <u>Ex Parte Luck</u>, 28 U.S.P.Q.2d 1875 (Fed. Cir. 1994). The Chang reference fails to meet this standard, and thus fails to anticipate the air bearing slider of claim 1.

Claims 2-6 depend on claim 1, and are allowable for the reasons given in support of claim 1.

Claim 2 is patentable, further, for the failure of Chang to disclose a resistance heating element mounted to the slider body.

Claim 3 is patentable, further, for the failure of Chang to teach or suggest displacement of a transducer due to thermal expansion of a transducing region and a slider body at respective and different rates in response to a temperature increase. Claims 4 and 5 are likewise additionally patentable for this reason.

Claim 6 is patentable, further, for the failure of Chang to teach or suggest a heating element as part of the controller. Any contention that Chang provides a "heating element" in the form of its central piezoelectric region is refuted by Chang's teaching that shaping is due to the piezoelectric effect, and temperature effects are to be compensated or reduced if possible.

Claim 22 is drawn to a magnetic data reading and recording apparatus, and incorporates features similar to those discussed above in connection with claim 1, including a transducer mounted for movement toward and away from the reference surface of a slider responsive to temperature changes; a control means for adjusting an operating temperature of the slider near the transducer to displace the transducer; and the displacement of the transducer independently of the reference surface to afford adjustment of transducer/data surface spacing independently of a nominal distance between the slider and the data surface.

Accordingly, claim 22 is not anticipated by Chang.

Claims 23 and 25-27 depend on claim 22 and are allowable for the reasons given in support of claim 22.

Claim 23 is patentable, further, for the failure of Chang to teach or suggest transducer protrusion from the reference surface corresponding to an active state, and retraction toward the reference surface corresponding to a passive state.

Claim 25 is patentable, further, for reasons given above in support of claim 6.

Claim 26 is patentable, further, for reasons given above in support of claim 4.

D. Claims 13-16 stand rejected under 35 U.S.C. 102(b) as allegedly anticipated by U.S. Patent No. 5,276,573 (Harada, et al.).

Harada discloses an aerodynamically supported slider that includes a flying height sensor. A microvalve 40, either piezoelectrically or electrostatically controlled, opens, closes or partially closes a vent 9 through the slider body, thus to control the slider flying height. A sensor 15 measures spacing from the magnetic storage medium, and a voltage applied to the piezoelectric or electrostatic element is governed by the sensor input. A transducer or reproducing head 4 is integrally formed at the trailing end of each of the side rails of the slider. There is no indication that either head is moveable relative to the remainder of the slider.

In the course of this rejection, it is contended in the Action that Harada discloses a sensor that measures spacing between the slider/head and the medium, which information is used to apply a voltage through a piezoelectric element which "inherently is heated and changes a thermal expansion coefficient, to vary the position of the head/slider in relation to the medium."

This contention is respectfully traversed. In Harada, the positions of transducing heads 4, relative to the medium, are changed by altering the slider position or flying height. The slider flying height is controlled by the opening/closing of vent 9.

Accordingly, with respect to the process of claim 13, Harada fails to teach or suggest changing an operating temperature of a slider to change a distance between the transducer and an air bearing surface of the slider, while maintaining the slider at a nominal spacing from the data surface of a data reading and recording medium.

Regardless of whether the piezoelectric element in Harada is inherently heated as the examiner contends, such heating has nothing to do with the opening or closure of the vent, nothing to do with the change in slider flying height responsive to vent opening/closure, and thus nothing to do with transducing head flying height.

Accordingly, the process of claim 13 is not anticipated by Harada.

Claims 15 and 16 depend upon claim 13 and are patentable for the reasons given in support of claim 13.

Claim 15 is patentable, further, for the failure of Harada to teach or suggest a slider body and incorporated transducing region with a thermal expansion coefficient greater than that of the slider, with heating increasing a distance by which the transducer protrudes from the air bearing surface.

Claim 16 is patentable, further, for the failure of Harada to disclose providing an electrical current to a resistive heating element mounted to the slider to change the operating temperature. Any heating of the piezoelectric element in Harada is at most incidental, and Harada does not teach any result or implication of whatever heating may occur.

New claims 31 and 32 incorporate limitations similar to those discussed above in connection with claim 1, and thus are believed allowable.

In summary, claims 1-33 incorporate subject matter patentable over the prior art of record, and define that subject matter with the clarity and precision required by 35 U.S.C. 112, second paragraph. An early and favorable action, indicating the allowability of all of these claims, is respectfully requested.

Respectfully submitted,
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Date: April 16, 1999

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CERTIFICATE OF MAILING

Pursuant to 37 CFR 1.8, I hereby certify that this Amendment in Application Serial No. 08/833,590 is being deposited with the U.S. Postal Service as first class mail, postage prepaid, addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on the date of deposit indicated below.

Date of deposit: April 16, 1999

Geralyn M. Vita

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